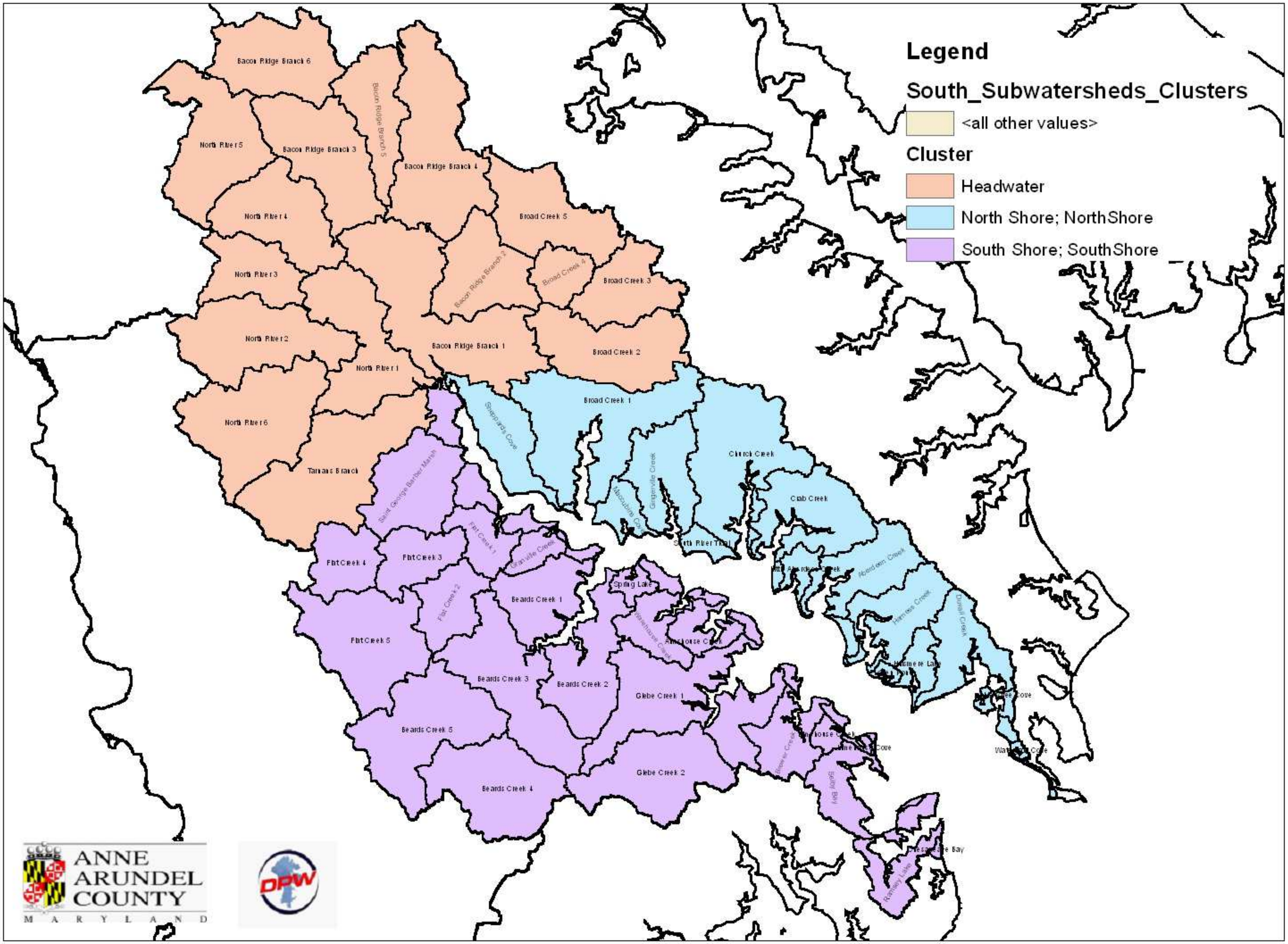
Maryland Water Monitoring Council
Maryland Streams Roundtable

Presented by:
Jesse Iliff
South RIVERKEEPER®

south river federation

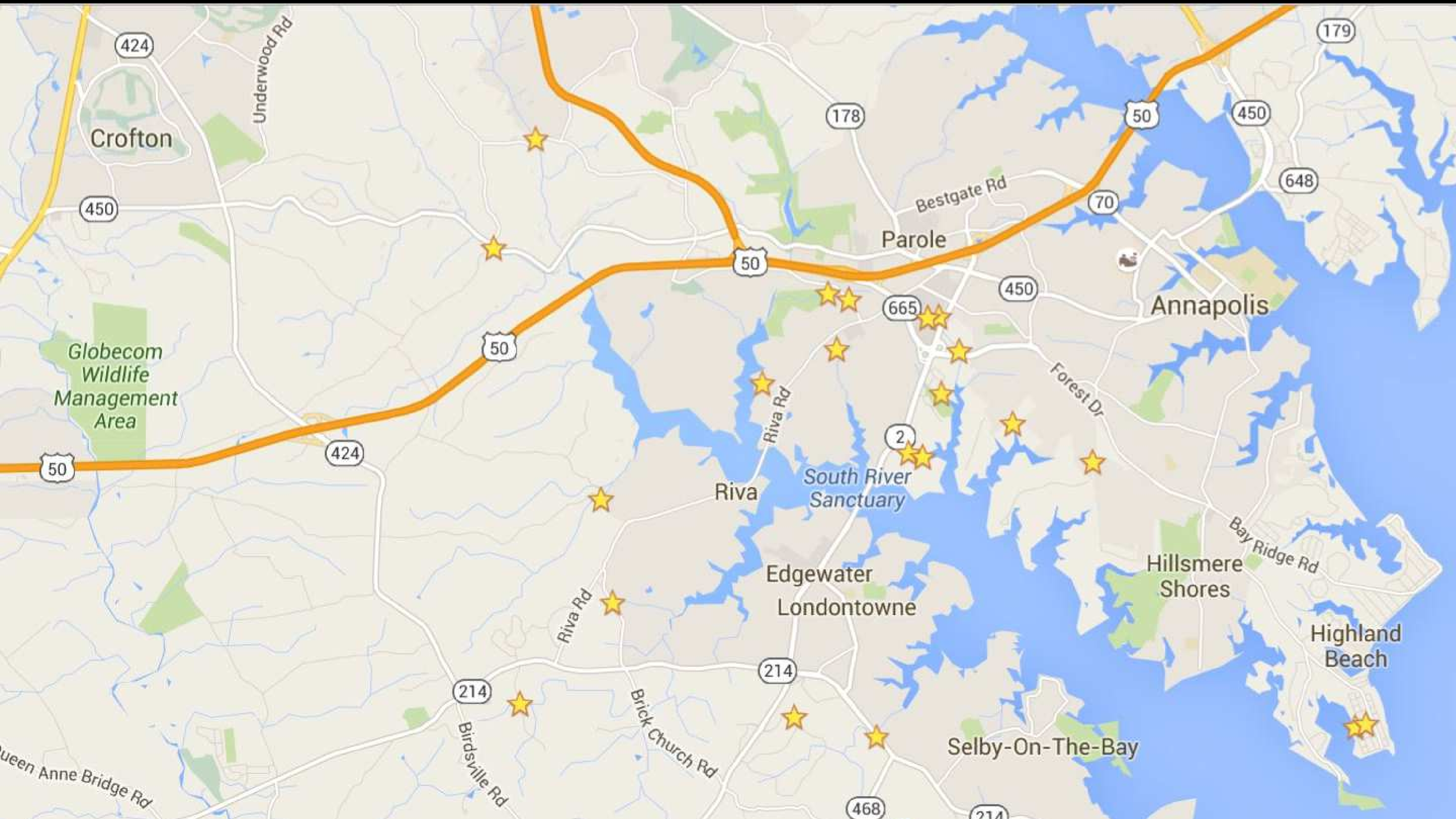
WATERKEEPER® ALLIANCE MEMBER

February 19, 2016


Legend
South_Subwatersheds_Clusters
<all other values>
Cluster
Headwater
North Shore; NorthShore
South Shore; SouthShore
Bacon Ridge Branch 6
Bacon Ridge Branch 5
Bacon Ridge Branch 3
Bacon Ridge Branch 4
Bacon Ridge Branch 2
Bacon Ridge Branch 1
Broad Creek 5
Broad Creek 4
Broad Creek 3
Broad Creek 2
Broad Creek 1
Church Creek
Crab Creek
Aberdeen Creek
Harness Creek
Duvall Creek
Flat Creek 4
Flat Creek 3
Flat Creek 1
Flat Creek 2
Flat Creek 5
Beards Creek 1
Beards Creek 2
Beards Creek 3
Beards Creek 4
Beards Creek 5
Glebe Creek 1
Glebe Creek 2
Spring Lake
ANNE
ARUNDEL
COUNTY
MARYLAND
DPW

The South River's 3 Main Subwatersheds:

- **Headwaters**
  - approximately 16,200 acres
  - 9% impervious
  - 152 miles of streams
  - 4 monitoring stations in headwaters
- **North Shore**
  - approximately 6,900 acres
  - 27% impervious surface
    - Incl: Church Creek sub-watershed--42% impervious surface coverage.
  - 21.3 miles of streams
  - 12 monitoring stations on the south shore
- **South Shore**
  - approximately 13,000 acres
  - 15% being impervious surface
  - 69.8 miles of streams
  - 5 monitoring stations on the south shore



424
Underwood Rd
Crofton
450
178
50
179
450
Bestgate Rd
648
70
Parole
50
450
665
Annapolis
Globecom
Wildlife
Management
Area
50
Riva Rd
Forest Dr
2
50
424
South River
Sanctuary
Riva
Bay Ridge Rd
Hillsmere
Shores
Edgewater
Londontowne
Riva Rd
Highland
Beach
214
214
Brick Church Rd
Selby-On-The-Bay
Queen Anne Bridge Rd
Birdsville Rd
468
214

Study Design

- 21 fixed stations for a robust data set
- The station names and corresponding longitudes and latitudes included in MWMC's "Big Map." (Coordinates determined with a Lowrance HDS-7, which uses the WGRS-84 coordinate system.)
- Bi-weekly sampling to capture long-term annual trends
- Periodic sampling during storm events to determine relationship between stream discharge and parameters of interest.

Monitoring- Non-Tidal

- 21 Non-Tidal Sites
- Since 2012, SRF has collected:
  - Temperature
  - Dissolved Oxygen
  - Conductivity
  - pH
  - Chloride
  - Weather/precipitation
  - TDS
- Monitoring performed bi-weekly for the above parameters with the YSI Pro Series Handheld and Quatro cable at 21 sites on Big Map
- Continuous monitoring in 15 minute intervals with a YSI EXO2 downstream from SRF's Church Creek restoration site.

Biological Monitoring

Site	Year Restored	SubW	Vegetation Monitoring		Benthic Macroinvertebrates			Amphibians				Fish			Birds
			Pre-Restoration	Post-Restoration	2006-2008	2010	2016	2013	2014	2015	2016	2015	2016	2017	2015
Wilelinor Valley RSC	2003	Church Creek			YES			YES	YES	YES	NO	YES	**YES**	**YES**	
Homestead Gardens RSC	2012	Beards Creek						NO	YES	YES	NO	NO	NO	NO	
DWS AWC Bog	2013	Beards Creek	YES	YES				NO	YES	YES	NO	NO	NO	NO	
Church Creek RSC	2014	Church Creek	YES	YES	YES		YES	YES	YES	YES	**YES**	YES	**YES**	**YES**	YES
Poplar Point RSC	2014	Church Creek	YES	YES				YES	YES	YES	**YES**	YES	NO	NO	
Southdown Shores RSC	2015	Beards Creek						NO	NO	NO	NO	NO	**YES**	**YES**	
Bausum / St. Johns	2015	Broad Creek						NO	YES	NO	**YES**	YES	**YES**	**YES**	
Truman MVA	2016	Broad Creek	YES	**YES**	YES	YES	**YES**	YES	YES	YES	**YES**	YES	**YES**	**YES**	
Harbour Center	2016	Church Creek	YES	**YES**	YES	YES	**YES**	NO	YES	YES	**YES**	YES	**YES**	**YES**	YES
Allen Apartments	2016	Church Creek						NO	YES	YES	**YES**	YES	**YES**	**YES**	
Bywater Branch	2016	Church Creek						NO	YES	YES	**YES**	YES	**YES**	**YES**	YES
Health Dept RSC	2016	Broad Creek						NO	NO	YES	**YES**	NO	NO	NO	
Jehl Stream Valley	2017	Broad Creek						NO	NO	YES	**YES**	YES	**YES**	**YES**	
Preserve @ Br Creek	2017	Broad Creek						NO	NO	YES	**YES**	NO	NO	NO	
Admiral Cochrane RSC	2017	Church Creek	YES	**YES**	YES			NO	NO	NO	NO	NO	**YES**	NO	
Bacon Ridge Branch	2018	Bacon Ridge Branch	YES	**YES**			YES	NO	NO	NO	**YES**	NO	**YES**	**YES**	
Glebe Creek RSC	2018	Glebe Creek						NO	NO	NO	NO	NO	**YES**	**YES**	

Fish Sampling Methodology

- Single pass electro-fishing using Smith-Root LR-24
- Standard team was 1 shocker, 2 netters, and a bucket man
  - Used a seine block net on larger sites
- Stored captured fish in an aerated live-well
- Identified species and measured length before returning to system
- Collected water quality data and habitat parameters

Plate 1: Herding fish into seine net

Plate 2: Measuring Golden Shiner(*Notemigonus crysoleucas*)

Post-Rest. Species Composition

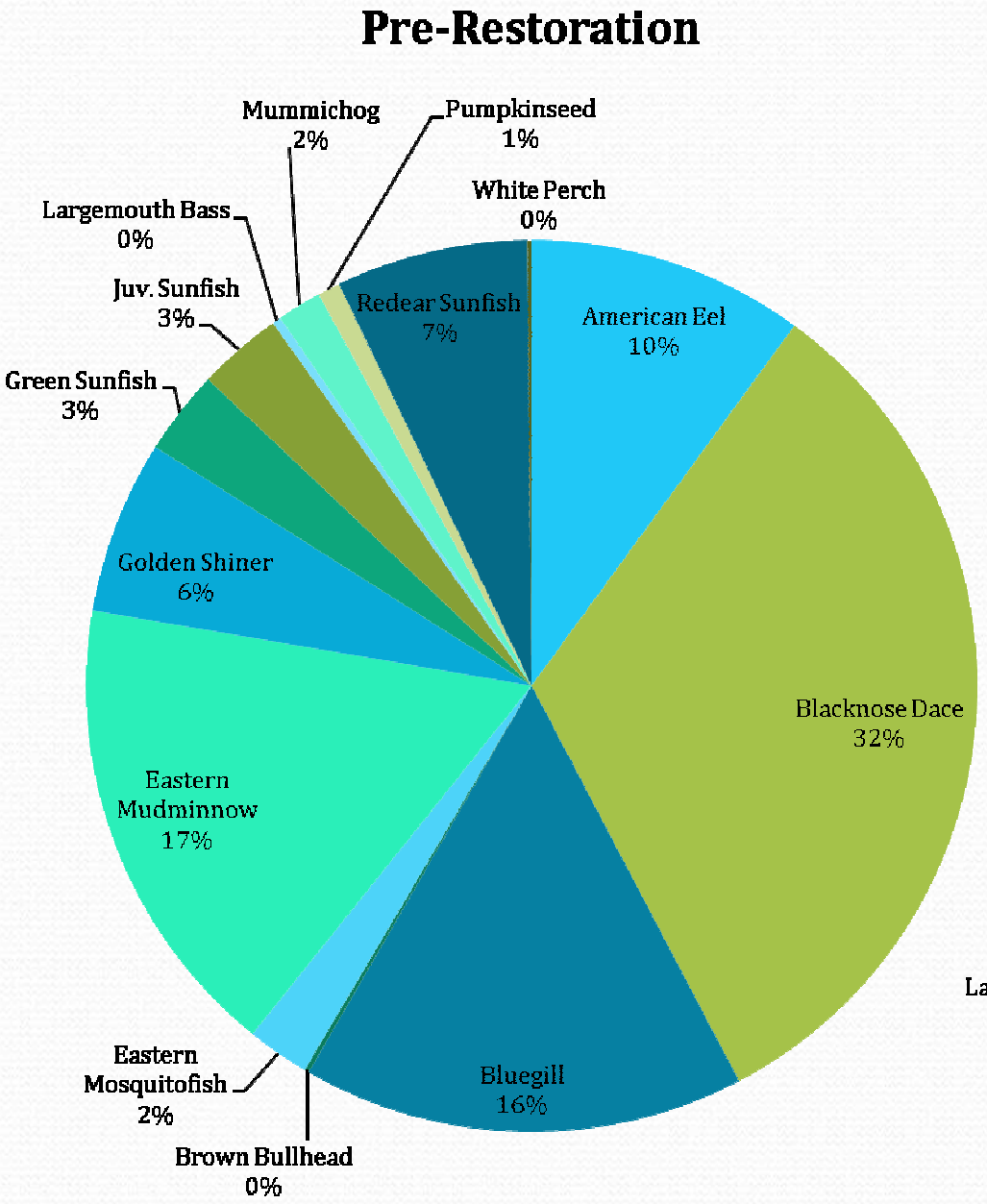


Chart 1: Pre-Restoration Species Composition

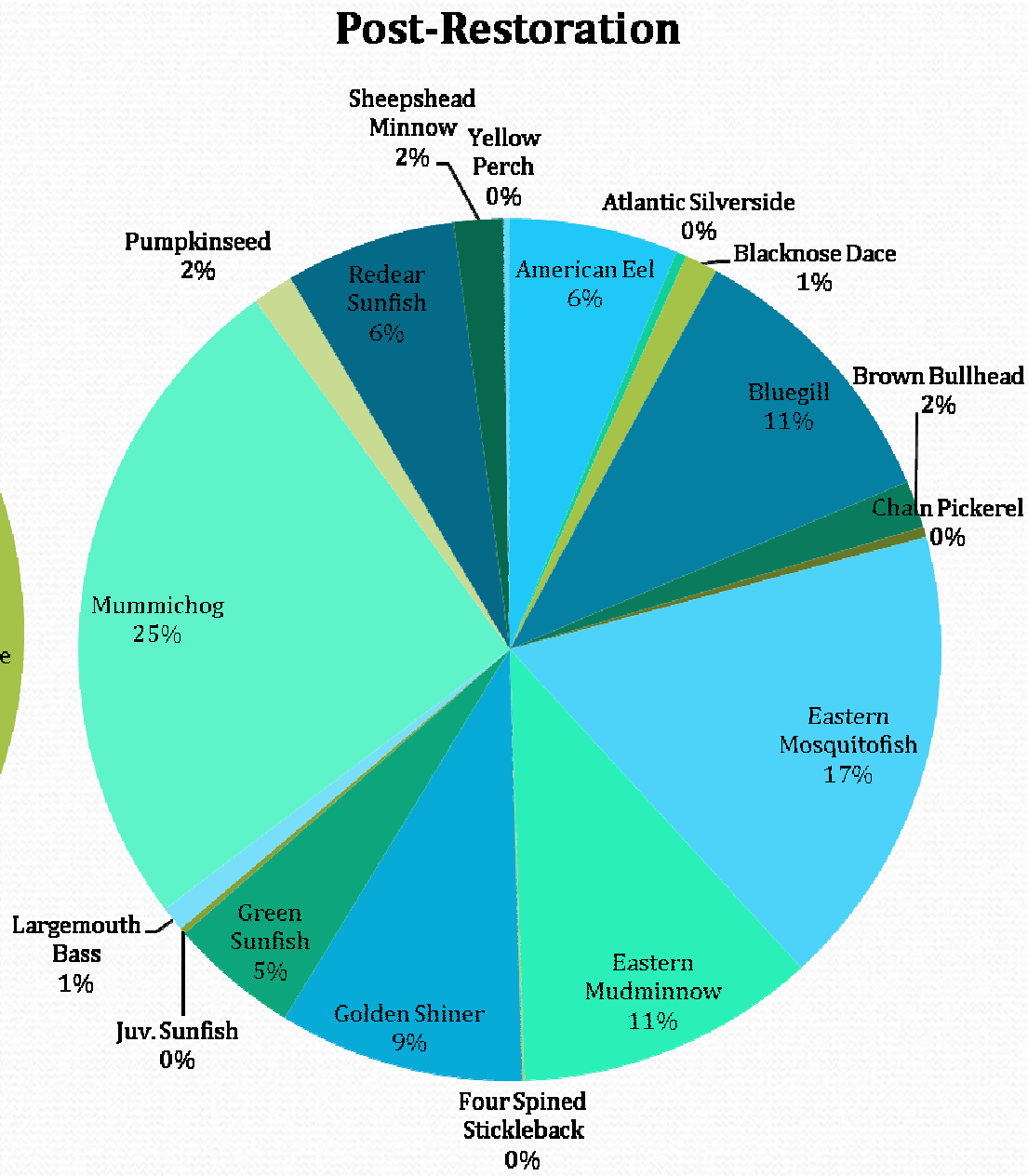


Chart 2: Post-Restoration Species Composition

Pre and Post Restoration Abundance

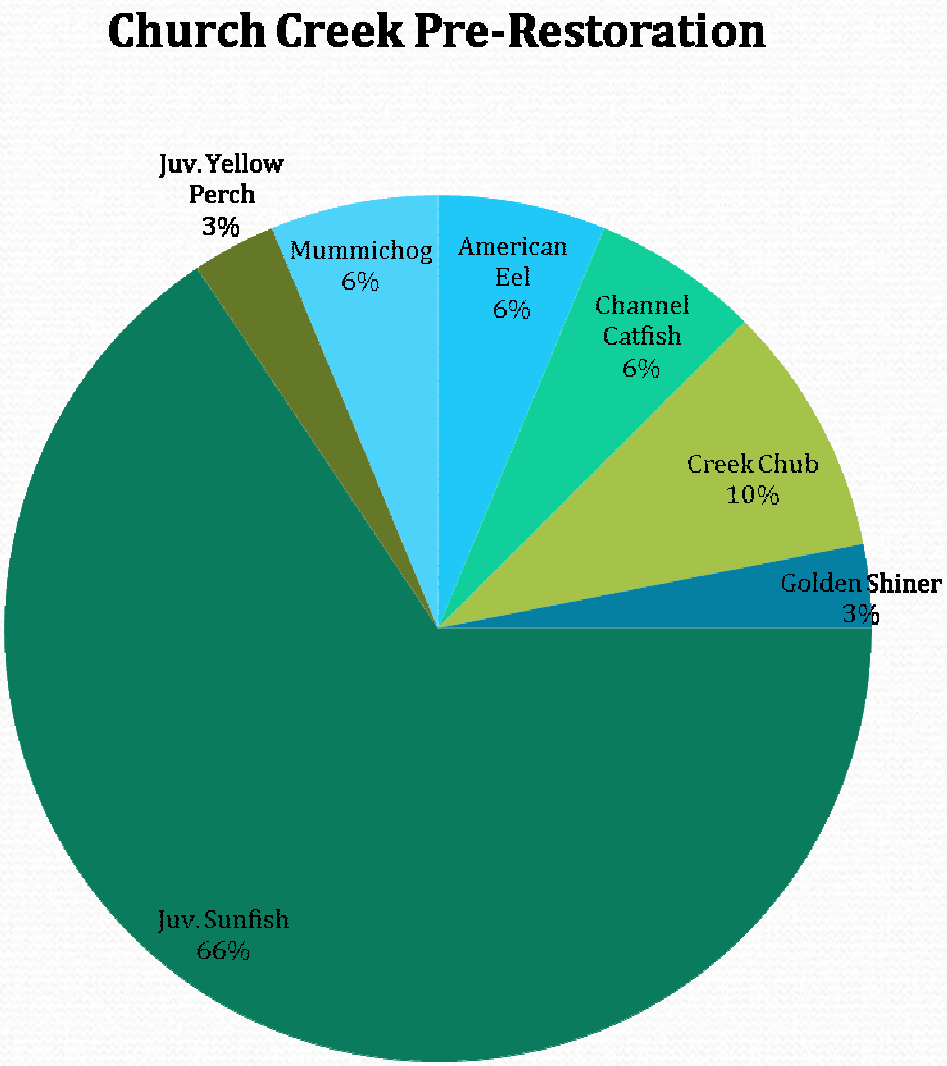


Chart 3: Church Creek Pre-Restoration Species Composition

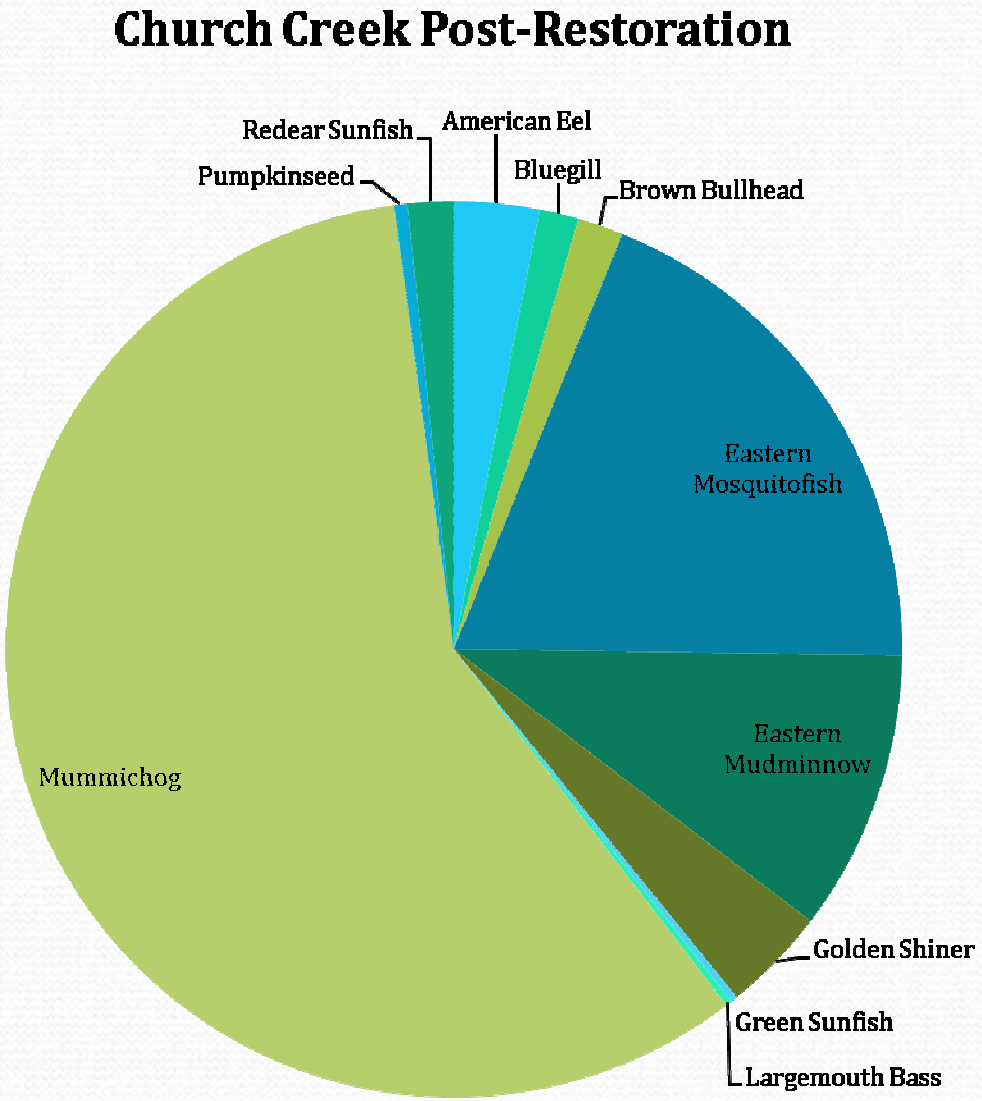
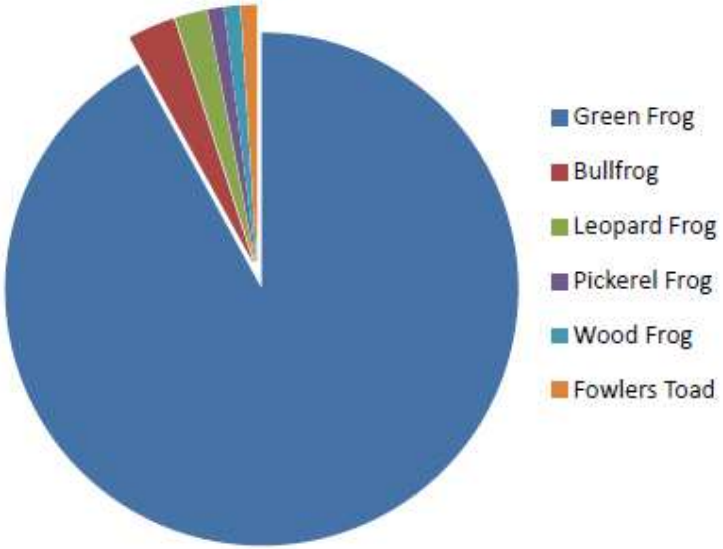


Chart 4: Church Creek Post-Restoration Species Composition

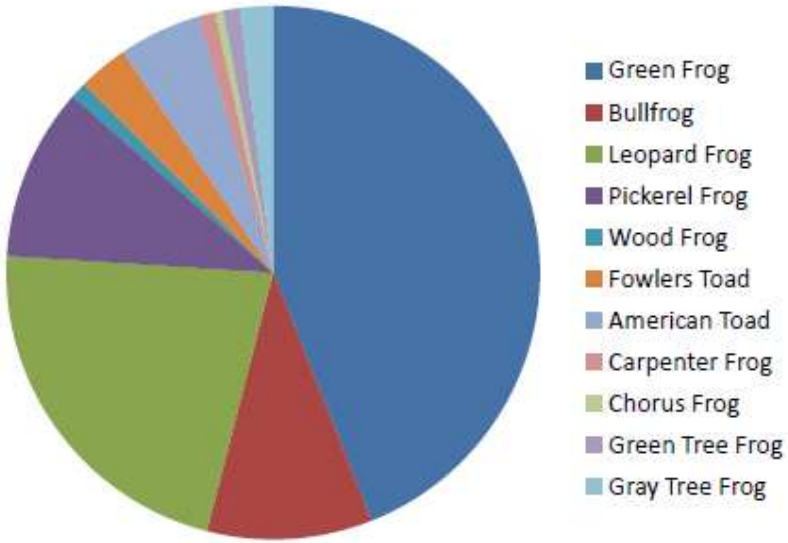
Amphibian Sampling Methodology (2013-2014 Seasons)

- 15 sites identified for study, 8 of which were pre-restoration, 7 were re-connected floodplains between .1-14 years post-disturbance
- Average of four observations across length of each site per visit, 3-4 site visits per year
- From one point, listen for frog calls and note any sightings for 5 minutes
- Walk for two minutes and stop for next survey site
- Repeat until end of project site is reached

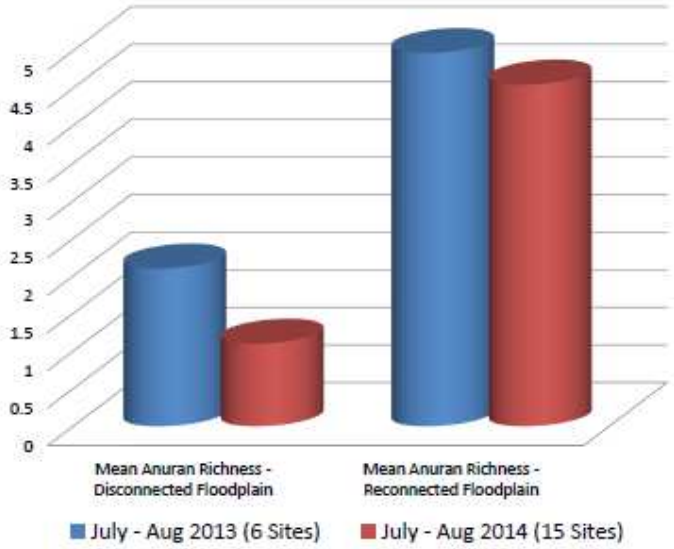
Species in Disconnected Floodplain Sites



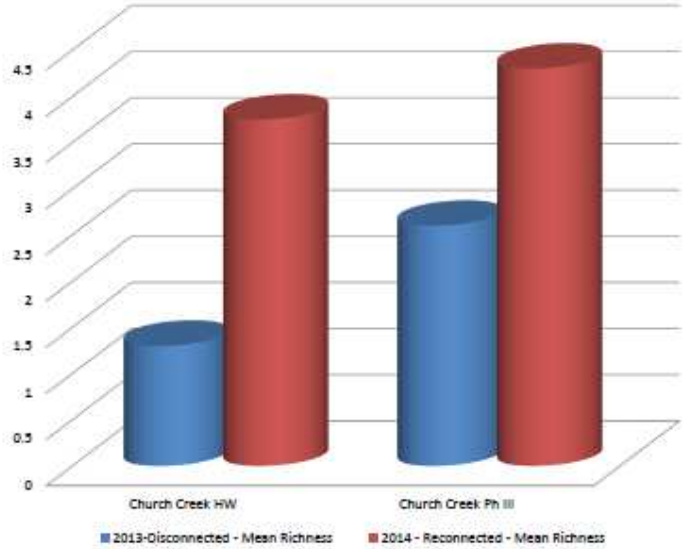
Evenness in Reconnected Floodplain Sites



Mean Anuran Richness in Disconnected vs. Reconnected Sites: 2013 Data vs. 2014 Data



Mean Anuran Richness in Church Creek Disconnected vs. Reconnected Sites (2013 pre-con vs. 2014 post-con)



2016

- Chemical Monitoring:
  - Same sites, Same parameters
  - Adding TDS to certain target sites
  - Looking into nutrient analysis

- Bio-Monitoring
  - Amphibians- 10 of the same sites and 2 new ones
  - Fish- 8 of the same sites, 4 new ones, abandoning 1
  - Benthics- 3 of the same sites, 1 new, abandoning 1

Questions?

Jesse L. Iliff
jesse@southriverfederation.net
410-224-3802
2830 Solomons Island Road
Edgewater, MD 21037